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Evaluating NESTA's Support for Science Learning

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Abstract

This paper reports on a commissioned research project to evaluate the impact of support (mainly funding) given by the UK government's National Endowment for Science, Technology and the Arts (NESTA) to various projects under the general heading of 'science learning' over a four-year period (2000 – 2004). Findings emerging from the study indicate that NESTA is an imaginative and risk-taking project funder, supporting innovative approaches to science education typically involving special events or producing web-based resources or other e-learning outcomes, typically with strong environmental, technological or creative themes. However, the article also reports on methodological and theoretical issues emerging from a medium-scale, largely retrospective evaluation, such as the pros and cons of a 'multi-method' approach (Saxe and Fine, 1979, Bennet, 2003); the need to construct a methodology that would be acceptable to the commissioning body, and the extent to which findings can be set within 'theories of change' frameworks proposed by Fullan (2001) and Harlen and Kinder (1997).

Key Words

Science, Learning, External, Change, Multi-method

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Introduction

The primary purpose of this article is to highlight methodological issues emerging from a medium-scale, largely retrospective, commissioned evaluation of a central government-sponsored programme to encourage innovation in science learning, both within schools and in the general population. It will highlight the ethical considerations implicit in constructing a methodology that would be acceptable to the commissioning body, and consider the strengths and weaknesses of a 'multi-method' approach (Saxe and Fine, 1979; Patton 1990; Bennet, 2003). Its findings will therefore be of interest to researchers submitting tenders for commissioned evaluations of publicly-funded programmes. However, in order to illustrate the issues arising it will be necessary to give a flavour of the content of the evaluation itself, together with a consideration of the applicability of the theoretical frameworks (Fullan, 2001; Harlen and Kinder 1997) which informed it.

Background

NESTA was set up by Act of Parliament in 1998 with a brief to help maximise the UK's creative and innovative potential. It is funded by an endowment from the National Lottery and uses the interest to offer individuals, groups and organisations support to explore new ideas, develop new products and services, or experiment with new ways of nurturing creativity in science, technology and the arts. To date it has made a total of 683 awards (source: www.nesta.org.uk, accessed 9.1.05). NESTA is a political project, in that it was established by central government with a view to improving the "UK's future international competitiveness" (NESTA 2005:1). Its mission reflects the concern in government circles that: "our future capacity for

innovation is threatened by the current state of science education in schools.” This means that any evaluation of its work will be influenced by the need to demonstrate cost-effectiveness in promoting “real” scientific enquiry in schools and “general scientific literacy” in the general public (ibid.), which in turn are assumed by government to lead to an improved scientific research base and hence to enhanced “innovation and productivity” (ibid.)

NESTA’s Learning (formerly Education) programme aims to ‘support innovative ways of learning that provide models for others to follow, and to enhance an appreciation of science, technology and the arts in people of all ages’. Its main objectives in this context are to

- Source innovative projects that may help to improve practice and/or policy in key strategic areas of learning
- Bring together on projects talented individuals and organisations who are committed to exploring and sharing new approaches in the fields of formal and informal education
- Achieve significant benefits for project participants, be they learners, teachers or educationalists
- Become a useful resource to policymakers and practitioners on innovation in learning

The learning programme started making awards in 2000, and as of August 2004 had made 48 awards to projects classified under the general heading of ‘science’ (though many of these bridge technology and/or the arts so fall under more than one category). In addition, NESTA took on the funding of the national ‘Science Year’ initiative (2001-2), which was subsequently extended to become ‘Planet Science’. Under this

banner, NESTA had supported a further 36 smaller projects to August 2004, with the following objectives:

- Raise the profile of science in schools, in further and higher education, and across the board with the general public;
- Change negative attitudes to science by raising public interest in, awareness, and understanding of science; and
- Promote the idea that science can be fun and relevant to everyday life

Science Innovations

As reflected in the above objectives, NESTA's involvement in science learning can be seen as part of a government response to 'hostile' media portrayal of science (for example in relation to genetically-modified crops or therapeutic cloning), seeking to: "reducing the risk that innovative science and technology is stymied by unnecessarily uninformed or polarised opinion" (NESTA 2005). It can also be viewed as a reaction towards increasing pupil disengagement with physical sciences, indicated by the falling numbers taking physics and chemistry at A-level (JCQ 2005) or university (HESA 1996; 2005). NESTA's learning programme promotes projects which cross traditional subject boundaries and make links between science, technology and the arts. Many are specifically concerned with developing greater creativity in scientific thinking, whilst others seek to build greater understanding of environmental issues, or to raise awareness of the relevance of science and promote uptake of science-related careers. Through a wide range of approaches (see findings below) NESTA-funded science learning projects are developing innovations in the communication of scientific information to different audiences and the changing of attitudes towards science. However, NESTA's work is only part of a much wider range of initiatives in

this area by government and charitable bodies, some of which are summarised in table 1.

Table 1: Organisations and initiatives contributing towards enhanced school science and public understanding of science in the UK

Organisation	Initiative(s)
Department for Education and Skills (DfES)	Key Stage 3 Strategy (2001 onwards): promoting scientific enquiry pedagogy in the 11-14 age range. Specialist Secondary Schools Programme (Science) (2003 onwards): permeating science across each specialist school, partners schools, employers and especially members of the General Public and the wider community.
Wellcome Trust	Network of National Science Learning Centres (2004 onwards): training primary and secondary teachers in 'industrially relevant' scientific enquiry 21 st Century Science: new GCSE syllabus with an emphasis on scientific literacy and controversial issues in current scientific innovation
AstraZeneca Science Teaching Trust	Innovative Project Awards (1997 onwards): funding innovations in primary science pedagogy
Royal Society	Partnership Grants Scheme: funding school-industry partnerships
National Lottery Commission	Funding for 'hands-on' science centres aimed broadly at the general public (1998 onwards), e.g. 'Explore @t Bristol', 'The Magna Centre' (Rotherham), 'The Life Centre' (Newcastle).
British Association for the Advancement of Science	'BAYS' clubs (19XX onwards): promoting out-of-school involvement in scientific enquiry by primary and secondary age pupils.

Aims and Ethical issues within the Evaluation Study

In May 2004, NESTA issued an invitation to tender for a study to evaluate its support for science learning projects. Its stated aims for the evaluation were as follows:

1. To "enable NESTA to share with external and internal stakeholders a clear and informed *Story* of why there is a need for these projects, why NESTA should be involved, how existing projects work, and why they are working

2. To “help us identify a way forward and potential partners for any future projects.” (Invitation to Tender, May 2004)

In submitting a tender for the contract to undertake this evaluation, the author’s team of four researchers from Bath Spa University College was required to accept the above as our aims, leading to a tension between our ethical requirement for independence, and what Yates (2004:156) describes as the pressure to “... come up with the answers the commissioning body wants... producing these answers in ways that will enhance the commissioning body’s profile.” The first aim above in particular appears to pre-judge the need for such projects, the necessity of NESTA’s involvement and their success. The political nature of the evaluation is here evident, in that one of the ‘external stakeholders’ can be inferred as central government. It was necessary, however, to communicate to NESTA our reservation of the right to question these assumptions in our findings, a right it readily agreed.

Several other areas of compromise arose as a result of the commissioned nature of the research. For example, two members of the research team worked closely with NESTA personnel to draw up a list of research questions (see below) that would address, to NESTA’s satisfaction, their aims for the study, but that would also satisfy the team’s interests in equal opportunities (question B3) and the mechanisms of institutional change (B1 and B4). Close liaison was also required to select a sub-sample of projects for closer study, since NESTA personnel were more closely acquainted with the nature and stage of implementation of each project; this could have led to the selection of a sub-sample casting a more favourable light on the programme as a whole, so to counteract the danger of collusion a ‘long-list’ was

drawn up collaboratively, from which the Bath Spa team made the final selection.

Access to project documentation was perhaps the major source of potential conflict, since it was all held within NESTA's confidential filing system, to which the team did not have access. Through negotiation over a period of several months, partial sets of documentation were sent to us, which in the context of a six-month contract with an immovable deadline led to an incomplete analysis of this category of data, limiting the evidence upon which findings could be based.

Further ethical issues emerged when we began to approach awardees and project participants. Although their consent was informed (by letter) and voluntary, NESTA made it known to them that their participation was expected as a consequence (if not a condition) of their funding. Our status as NESTA's 'official evaluators' sometimes made it difficult to reassure those from whom we were seeking to elicit data of our independence.

Research questions

The process of negotiating the list of research questions with NESTA is described above, together with the compromises this involved. It became helpful to divide the growing list of questions into two categories; those of principal importance and those that would be subsidiary or elaborative of the main questions. Accordingly, the principal list (A) was agreed as follows:

- A1. Within what external science education environment – both nationally and locally – have the selected innovations been proposed and implemented?
- A2. What perceived or actual needs did each innovation propose to meet?

- A3. How has NESTA funding been used within the implementation and (if appropriate) continuation phases of each innovation?
- A4. How has each innovation been managed within the organisation concerned?
- A5. What outcomes (over either short or long term as appropriate) has each innovation achieved in terms of Harland and Kinder's (1997) model?
- A6. How do key stakeholders and/or recipients rate the success of each innovation?
- A7. How do the processes and outcomes of each innovation compare with each other and with projects funded by AstraZeneca Science Teaching Trust? (*n.b. members of the research team had access to data relating to this scheme*)

The set of subsidiary or elaborative questions (B) was as follows:

- B1. To what extent does each innovation build upon others, both within and outside the organisation concerned?
- B2. How many teachers and/or pupils have been 'reached' by each innovation?
- B3. Is there evidence that the innovation has made an impact upon *all* learners regardless of attainment, ethnic or social background?
- B4. To what extent has the innovation been central to the mission of the organisation concerned, involving a shift of culture?
- B5. What, if any, are the physical products of each project?
- B6. What would have been achieved without NESTA's support?
- B7. Have some models of NESTA's support or management been more effective than others?
- B8. What are the replication and dissemination implications for each project?
- B9. What recommendations can be made for a longer-term evaluation strategy?

In terms of evaluation theory, the selection of research questions has drawn on Jenkins' four-stage evaluation process (1976): *context* (principal questions 1 and 2, subsidiary question 1), *input* (principal question 3), *process* (principal question 4, subsidiary question 4) and *output* (principal questions 5-7, subsidiary questions 5-8). It should be noted that only subsidiary questions 6 and 7 could be classified as 'causal' (Miles and Huberman 1984), the remainder being 'non-causal' types since these are consistent with NESTA's aim of telling the 'story' of their involvement with science learning (see aim 1 above). Their nature is reflected in the methodology adopted (see below).

Underlying theories of educational change

NESTA specified a 'theories of change' model for the evaluation in the invitation to tender, whilst not specifying which theories they had in mind. The research team, recognising that the evaluation was to be 'theory-driven' (Chen 1990), suggested that the school-based framework proposed by Michael Fullan (1985, 1991, 2001) would be appropriate, a suggestion which was accepted by NESTA. However, subsequent investigation revealed that although 50% of Science Learning Awards were targeted at primary or secondary age pupils, with a further 19% aimed at teachers, few were actually located in schools. This called into question the applicability of Fullan's model to this evaluation; however we decided to use the findings from the evaluation to test his claim for its applicability to educational change at the local, regional and national level (2001). It is therefore useful to outline it briefly here.

Fullan (2001) stresses that "educational change is technically simple and socially complex" (p. 69), that it takes time to embed and that its adoption is dependent on the

characteristics of the change, local characteristics and external factors. He characterises innovative educational change as composed of four phases: *initiation* (the process leading up to and including the decision to innovate), *implementation* (first experiences of using the innovation in teaching and learning), *continuation* (the extent to which the innovation is either integrated into practice or discarded), and *outcome* (the degree of 'improvement' in, say, pupils' learning or teacher attitudes). Ownership of any change by practitioners is clearly important, but may develop over time rather than being present in the initial phases. The most difficult phase - *continuation* - represents another adoption decision, and Fullan (ibid.) notes that only a minority of well-implemented projects continue after funding has elapsed. Overall, Fullan's model may appear to be somewhat linear, though he describes the process as one of "... incremental and decremental fits and starts on the way to institutionalizing (or, if appropriate, rejecting) the change in question (op. cit., p. 93).

In considering the outcomes of NESTA-funded innovations in terms of impact upon participants' practice (question A5) the study has also drawn upon Harland and Kinder's (1991, 1997) model of staff development outcomes as the result of inservice training (INSET). Again, we have taken a teacher-based model and sought to test its applicability other professionals involved in the implementation of an innovative programme. Harland and Kinder critique the *initiation* phase in Fullan's model, pointing out that there is a difference between provision and use of new materials. They have also elaborated on Fullan's *outcome* phase by developing a typology of nine kinds of outcomes relating to different phases within the Fullan model:

1. Material and provisionary outcomes (new resources)
2. Informational outcomes (background facts and news about developments)
3. New awareness (changed perception)

4. Value congruence outcomes (building on personal philosophy of education)
5. Affective outcomes (e.g. increase in confidence)
6. Motivational and attitudinal outcomes (e.g. increased enthusiasm)
7. Knowledge and skills (deeper levels of understanding, critical reflexivity)
8. Institutional – strategic outcomes (e.g. whole-school curriculum changes)
9. Impact on classroom practice (developments in teachers' classroom teaching)

They have further (1997) ranked these outcomes in a hierarchy of those most likely to lead to change (table 2), suggesting that successful implementation requires all the outcomes, as prioritised in the hierarchy, to be either achieved through the in-service provision or present as pre-existing conditions.

Table 2: Harland and Kinder's hierarchy of outcomes from educational innovation

	INSET input		
3 rd order	Provisionary	Information	New awareness
2 nd order	Motivation	Affective	Institutional
1 st order	Value congruence	Knowledge and skills	
	Impact on practice		

Source Harland and Kinder (1997: 77)

The team needed to make a number of compromises in assessing impact upon professional practice, forced upon us by the short time-scale and largely retrospective nature of the study (few of the projects were ongoing during the period of evaluation). This meant that we were limited in most cases to asking for participants' opinions of the outcomes of each project, which, consistent with an illuminative (Parlett and Hamilton 1976), constructivist (Guba and Lincoln 1989) or interpretative approach (Greene 1994) which considers stakeholders' views of the success of a programme (question A6). NESTA did not view this lack of direct observation data as particularly problematic since this was in their view a summary evaluation which

drew upon other project reports which did include observational data. Our access to these, however, was limited (see above).

Methodology

As a commissioned evaluation, this study might appear to fall within what MacDonald (1976) terms a *bureaucratic* model (characteristic of a consultant-client relationship). However, NESTA's brief to 'tell a story' from different perspectives necessitated some aspects of a *democratic* model (ibid.), negotiated and collaborative with awardees and other stakeholders. In the case of a commissioned evaluation, Yates (2004: 133) suggests that an acceptable research design will be one whose methodology and details are "ideologically in harmony" with those of the commissioning body. By stressing both *process* and *outcome* in the invitation to tender, NESTA effectively sanctioned an approach with both formative and summative elements. The formative purposes are summed up in question B9, but created a tension for the research team between our espoused democratic, illuminative stance and the largely retrospective nature of the data available to us, which were more consistent with the study's summative, bureaucratic elements. An appropriate balance between these conflicting requirements appeared to be offered by a multi-method approach (Saxe and Fine, 1979, Patton 1990, Bennet, 2003): "an approach which contains both formative and summative dimensions, which draws on a range of research strategies and techniques, and which generates both qualitative and quantitative data." (Bennet, 2003: 57). Such approaches are now an established feature of programme evaluation research (Clarke 1999), offering a number of associated benefits:

- “They permit exploration of both the outcomes and processes associated with a new programme
- They result in improved and enriched findings, yielding greater understanding of what is happening, why it is happening and how it is happening
- They permit modifications to be made to aspects of the evaluation plan should unanticipated outcomes worthy of further exploration be encountered
- They generate multiple sources of data which provide checks on the validity and trustworthiness of the findings” (Bennet 2003: 59-60)

Within the overall multi-method approach, this study has sought to provide answers to the research questions from multiple perspectives, by triangulating data of the following types:

1. Documentary evidence, including a literature review to answer research question A1 and documents supplied by NESTA from all 48 Science Learning projects and 22 Science Year/Planet Science projects. The documents analysed for each project type are listed in table 3, which demonstrates the incomplete data set available for this level of analysis. However, these data were supplemented by electronic profiles for each project on the NESTA website (www.nesta.org.uk) and some gaps were filled from the sources listed below. The documentation contents were initially summarised on a spreadsheet with the following variables, both quantitative and qualitative:

- Dates of starting and (if appropriate) completion
- Funding from NESTA
- External funding amount
- External funding body(ies)
- Region
- Type of organization
- Size of organisation
- Needs identified (research question A2)
- Previous work built upon (research question B1)

- Project aims & objectives
- Audience or target group
- Targeting of disadvantaged groups (research question B3)
- Approach taken (research question A 3)
- Numbers of target group 'reached' (research question B2)
- Outcome(s) (research question A5)
- Reported 'successes' (research question A6)
- Replication / dissemination (research question B8)

The spreadsheet was next searched for frequencies of particular words or phrases (e.g. 'teachers', 'learning', 'impact', 'culture shift') and the frequencies summarised in bar charts to provide an overall picture of the nature of projects supported.

Table 3: Documentary evidence analysed in addition to profiles on NESTA website

Science Learning Projects		Science Year/Planet Science Projects	
Project name	Document name(s)	Project name	Document name(s)
5 for Sydney	Request for funding document	Frontiers: Science in Libraries	Interim Evaluation Report
ACRISAT	Research report EMSET Report Update reports (2)	At home with science booklet	Evaluation Report
Antarctic Waves	Proposal outline Evaluation strategy Publicity Evaluation Supervisor Reports	Science Year lecture series	Summary Report
Arts Catalyst	Final Report (draft)	Putting the Spark into Science	Final Evaluation
The Climate change Explorer	Full proposal	Partnership Grants Scheme	Annual Report 2001/2
Birmingham Acrisat	Case Study proposal	Laughlab	Final Report
Bradford Conference	Proposal and costings document Conference overview	Footprints	Report
Brain Games	Progress Report Evaluation Report Workshop outline Further plan Report	DNA Day	Project Report
Brighton Acrisat		Graphic Science	Audience Research Report
Cape Farewell	Full proposal	Motivate	Evaluation
Centre of the Cell	Proposal outline Project Signoff form Summary of achievements Draft business Plan	sciZmic	Final Report
Chill Out Antarctica	Final Report	Science Year on Tour	Full Report
Connections in Space	Request for support Final Report	Science Live	Project Sign-off Evaluation
ECSITE conference	Evaluation Report	Wise Vehicle Programme	Annual Report 2001-2
Eden project	Outline project Email correspondence	Student Review of the Science Curriculum	Consultation Report
Eisteddfod Experience	Proposal overview Business plan	Sci-Circus	Full Report
Eureka	Project Milestones document	Planet Science Outreach	Pilot Phase Report
Inner Space Outer Space	Proposal Overview Final Report	Work Experience Project	Final Report
Jubilee exhibition - ThinkTank	Proposal overview Progress Report Evaluation report	Festival of Science and Culture	Final Report
Launchpad	Proposal Outline	Science on Stage	Report
Lego	Proposal Outline Supervisor report		

	Final Report (draft)		
Microscope Manual	Manual overview		
Music and the Mind Festival	Proposal description Final Report		
Nestonauts	Outline template Project Update		
Orchestra of the Age of Enlightenment	Proposal overview Impact Assessment Report Internal Closure Report		
Planet Jemma	Full proposal		
Planetarium	Proposal outline Briefing notes		
Product of the Future, Sci Museum	Proposal Outline		
Recordat QCA	Proposal outline		
Roboteers in Residence	Full proposal Evaluation		
Royal Society (Genetic Futures)	Proposal Outline Final Report		
Sciart	Proposal Outline Proposal document Final Report		
SciArt Exhibition	Full proposal		
Science Academy Study	Project overview		
Science Cities	Proposal outline		
Science Line	Outline proposal Full Proposal Evaluation documents Progress Reports		
Science Worlds	Proposal outline		
Scottish Executive	Outline proposal Quarterly report		
Special Steps	Full proposal		
Technogames	Proposal Overview Supervisor's report Final Draft Summary		
Theatres of Science	Lecture overview Final Report		
Visions of Science	Proposal outline		
Winchester Festival	Extension funding proposal		
Young Foresight	Full proposal Supervisor's report Phase one Evaluation Summary		

Table 4: Triangulation of data sources against research questions

Research question	Documentary sources	Web questionnaire	Case studies
A1	•		
A2	•	•	•
A3			•
A4	•	•	•
A5	•	•	•
A6	•	•	•
A7		•	•
B1		•	•
B2	•	•	•
B3	•	•	•
B4		•	•
B5	•	•	•
B6		•	•
B7			•
B8	•	•	•
B9	•		•

2. A web-based questionnaire combining quantitative and qualitative items (appendix 1), sent to contacts in all projects listed above, with a return rate of 46%. An adapted version was also sent to 10 projects funded by AstraZeneca Science Teaching Trust (research question A7) with a return rate of 30%. As for the documentary evidence above, quantitative data were summarised in charts, whilst qualitative data were searched for frequencies of significant words and phrases. The results were then compared with equivalent data from the documentary analysis and checked for corroboration, thereby assuring a degree of internal validity (Hopkins 1989), though it is acknowledged by interpretative evaluators (Greene 1994) that data obtained from different stakeholders may reflect different views and therefore be contradictory.

3. A stratified sample of ten projects for case study, consistent with NESTA's requirement to 'tell a story'. Projects for case study was selected to arrive at an overall sample with the following characteristics:

- a range of NESTA funding amounts, consistent with the range in the overall population of projects;
- A range of different sized and types of organisation funded, representing the types in the population;
- A range of age-groups and types of audience targeted;
- A range of degrees of NESTA involvement (on a scale of zero = no involvement to five = NESTA-run);
- a range of approaches taken, representative of the approaches taken overall
- a range of geographical locations;

- a range of stages of implementation (to provide both formative and summative findings).

Two case studies were also undertaken of AZSTT projects representing a similar proportion (20%). The purpose of studying a sample of projects in greater detail was to provide a greater depth of insight into the issues identified through the sources above. Each case study involved collecting the following categories of data in addition to those specified above:

- Telephone or (if possible) face-to-face semi-structured interviews with a selection of key stakeholders: awardees, managers, project participants;
- Where the project was on-going, observations of work in progress;
- Where appropriate, digital photographs of project processes and/or outcomes.

Interviews were of particular importance to acquire a full understanding of the nature of each project, its principal objectives and the theory behind its design and implementation. They were conducted after analysis of documentary evidence, and tailored to the project concerned (see appendix 2). Data collected for case studies were synthesised into narrative reports under the following headings:

- Needs analysis and rationale
- Project management
- NESTA's involvement
- Outcomes (analysed against Harland and Kinder's framework – see above)
- Impact (including analysis against Fullan's model of change – see above)
- Perceptions of success (including judgements of value for money based on breadth and depth of impact against budget)
- Key messages

Overview of Findings

The national science education environment within which the innovations have taken place (question A1) is briefly outlined under ‘science innovations’ above. Locally, case study data indicate that socio-economic deprivation has been seen as associated with lack of access to scientific information, in areas such as East London, South Wales and Yorkshire and Humberside. From documentary evidence, needs analysis (question A2) does not appear to be a strong feature of NESTA Science Learning projects. For those projects addressing stated needs, nine identified declining interest or low take-up amongst ‘young people’ in science in general, or within specific branches such as physics. A further six noted under-provision of science-related resources, either within a specific locality or in relation to a specific aspect of education, e.g. SEN. Two were concerned with low attainment amongst minority ethnic pupils, however only one (case study 1) presented research data to quantify or provide evidence for the needs stated. Interview data collected for case studies suggest that needs arose from, for example, perceived lack of engagement between a medical school and the local community in the East End of London; poor access to science information in low income communities in South Wales or Yorkshire/Humberside; limitations of existing e-learning resources for children with special needs; disengagement amongst secondary-age pupils or poor continuity and progression between primary and secondary science education.

Documentary evidence suggests that NESTA funding averaging £53K has been used for a diverse range of activities (question A3), with a strong bias towards e-learning (online and CD-ROM), balanced by a roughly equal number seeking to affect change in a more traditional way by mounting some kind of event, generally involving hands-on workshops or training. For 15 projects, NESTA funding has been used to attract

further funding, with an average of £147K, roughly three times NESTA's investment. This supports the widespread perception amongst stakeholders interviewed for eight of the 10 case studies that they represent 'good value for money' (see above) and that NESTA's involvement added perceived 'credibility' to projects when seeking further funding.

Data from the web survey suggests a preference for the 'steering group' as a model for project management within awardee organisations (question A4). This is echoed in the case studies, most of which were managed by a small, relatively informal, executive group with support from a steering group or committee. From case study data, collaborations between different bodies or departments within organisations have necessitated slightly more complex management arrangements, which have occasionally suffered from lack of commitment from parts of the consortium or senior management. Where a single manager has taken the majority of decisions it has been important for them to be closely supported by a small group; where parts of this group have become detached or in dispute with the manager this has weakened the project.

From analysis of documentation and web survey it would appear that most Science Learning projects were able to demonstrate limited outcomes in terms of Harland and Kinder's model (question A5), largely restricted to information or resource provision – the least significant in the above model. Several Science Year/Planet Science were able to demonstrate raised awareness in the target audience, with some evidence of new skills acquired. However, case study data suggest that five of the nine Science Learning projects developed new knowledge and skills in their target audience, and a further two claimed some degree of impact upon practice. Furthermore, a majority of

projects replying to the web survey anticipated greater medium-to-long-term impact, even if their impact to date was relatively modest.

Despite the apparent lack of impact, all three sets of data point towards a high degree of success achieved by most projects as rated by their awardees, target audiences, associated organisations and evaluators (question A6). From the web survey, awardees claimed to have met their aims to a broad extent, and also to have satisfied their success criteria. All of the case studies include perceptions of success from perspectives other than those of awardees: three contain strong indicators of success from educators (teachers), whilst five have evaluation data from learners indicating a degree of engagement and enjoyment. One has received positive reviews and a major award as significant external validation, whilst for another success is seen both by awardee and NESTA as highly dependent on further funding.

In comparing processes and outcomes of projects with each other (question A7) documentary evidence suggests that projects adopting online learning, other forms of e-learning and exhibitions as their approach ‘reached’ the largest audience numbers. However, data from case studies imply that CD-ROMs have achieved ‘lower level’ outcomes (in Harland and Kinder’s model) than other approaches. Documentation suggests that projects adopting an approach involving training or workshops tended to have fuller evaluations and were more successful than other approaches in making ‘measurable’ impact upon their target audiences. In comparing outcomes with those from AZSTT projects (A7), web survey and case study data suggest that the latter all claimed new skills for their primary teacher audiences, raised awareness, changed attitudes and shift in professional culture. In particular, AZSTT projects appear to

have been required to set more clearly measurable criteria than NESTA's and to collect more rigorous evaluation data, partly accounting for a greater confidence in their achievement, though the small sample size suggests caution in drawing broader comparisons between the two programmes.

NESTA Science Learning awardees report extensive experience in undertaking similar prior projects in bid documentation (question B1). This indication of a proven 'track-record', with preliminary work taken as 'prototyping' or 'proof of concept' appears to have been more important in selection than rigorous needs analysis. 13 bids were for second or subsequent phases of ongoing projects, seven built upon initiatives previously funded by NESTA, 14 reported previous experience of undertaking a very similar project (e.g. producing a CD-ROM, mounting an exhibition or conference) and three have developed out of pre-existing collaborations (e.g. between a regional science museum and the Royal Institution). This is reinforced by data from case studies, seven of which were funded on the basis of existing initiatives or expertise, upon which the proposed projects intended to build.

The numbers of target audience 'reached' (question B2) reported in project documentation vary hugely, from 17 to 3 million per month ('hits' on the Science Line website, though this represented a growth of 0.5 million per month from pre-NESTA funding figures). The mean for projects reporting that they had 'worked with' their target groups was 172. From documentary evidence a significant minority of projects (35%) claimed to be targeted at 'disadvantaged groups' within society (question B3). Of these, nine projects aimed to cater for minority ethnic groups, seven to target girls, two for 'disaffected pupils', three for pupils from socio-economically

deprived areas, two for sight or hearing-impaired pupils, two for children with special educational needs, one for people with disabilities and one for elderly alzheimer's sufferers. This is reinforced by data from the web survey, which suggests a significant targeting of 'disadvantaged groups', and from three of the case studies. Web survey data indicate a high degree of success in making an impact upon such groups in the view of awardees, and data from one of the case studies are convincing in this respect.

Data from the web survey point towards a close relationship between project aims and organisational mission (question B4), an encouraging sign in since innovation is more likely to become embedded in practice if it is closely related to the existing aims (Fullan, 2002). However, this positive picture is somewhat offset by web survey data suggesting a majority of questionnaire respondents reporting low levels of support from senior management. Data from three of the case studies suggest a shift in organisational culture as a result of working on the projects concerned. From project documentation (section 4.14) the majority of Science Learning projects specifying outcomes (29 of 45) described these in terms of a physical product (question B5), e.g. a report (5), CD-ROM (6), website (12), exhibition/exhibit (8), video/TV (5), printed materials (7) or a piece of new technology (2). In the case studies, two resulted in the production of CD-ROMs; three in exhibitions and one in a website.

Web survey respondents indicated that they would have been very much less successful in reaching the aims of their projects without NESTA funding (question B6), and all 10 case studies report that NESTA's support has been vital in getting their projects off the ground, such that in most cases the project would simply not have taken place without it. All case study awardees have been extremely positive

about NESTA's flexibility in the management of funding, and the sensitivity of the support offered. Whilst most of the web-survey respondents regarded NESTA as having taken a very 'hands-off' approach, a differentiated model is suggested from the case studies, where in some cases NESTA were directly involved in running the project, appointing a consultant, or close supervision through a project supervisor. No one approach appears to have produced 'better' outcomes (question B7), however in one case where NESTA had 'lost track' of a project temporarily this led to concern about quality and timescale for delivery.

From documentation most Science Learning Projects sought to disseminate through websites, the media (especially radio and newspapers/magazines) or through conferences (question B8). For some of the physical outcomes, case studies suggest that dissemination has been a problem, and some case studies have attracted surprisingly little media coverage, potentially limiting their impact. Although several projects have plans for replication, data from the majority of case studies suggest that NESTA is unwilling to be involved in supporting dissemination or replication.

Although several Science Learning and the majority of Science Year/Planet Science projects had included some form of evaluation (question B9) in project documentation, the huge variation in detail and quality of these suggests that further guidance from NESTA on this important aspect of project management is probably needed. The evaluation report to NESTA has suggested that more support in setting measurable learning outcomes and collecting data against these would be useful. It has also recommended appointing external evaluators for each project – as in the case of AZSTT (see question A7) above to work with awardees, monitor progress and collect evidence of impact throughout and after each project. In terms of future

evaluation of NESTA's Science Learning programme, our report has suggested a continuous and formative approach, involving both internal and external components with access to participants and stakeholders before, during and after each innovation in order to gather qualitative observation data on changes in practice, learning and institutional culture.

Discussion – Theories of Change

Fullan's four-stage model of educational change (1985, 1991, 2001), referred to above, was used by the research team to characterise the stage of implementation of each of the case study projects. Indeed, data from all 12 case studies were able to be categorised in this way (table 5), suggesting that the model could be applicable to projects outside the school settings within which it was developed, as Fullan (2001) claims. For example, Antarctic Waves (case study 2) – the development of a CD-ROM of digitised data from the British Antarctic Survey to stimulate musical composition in secondary-age pupils – was judged to have moved through Fullan's *innovation* and *implementation* phases, but had not yet reached *continuation* as schools who had been involved in piloting the resource were in some cases no longer using it. In some of the case studies, however, a linear reading of Fullan's model does not adequately describe the process of change. For example, in the case of Living with Science (case study 6) - a collection of science learning software for children with special educational needs - the *innovation* and *implementation* phases were being undertaken concurrently as the resource was being developed through piloting and discussion by pupils in 10 special schools. It had not yet reached Fullan's *continuation* phase, but for the pupils involved it has already achieved learning *outcomes*, apparently a later stage of the process.

Table 5: Characterisation of case study projects in terms of Fullan's model of change and Harland and Kinder's classification of outcomes

Case study	NESTA funding	Approach taken	Fullan (2001) stage	Harland and Kinder (1997) outcomes
1. Brighton ACRISAT	£25K	Workshops Website	Continuation	Impact on practice
2. Antarctic Waves	£101K	CD-ROM	Implementation	New knowledge/skills
3. Centre of the Cell	£70K	Exhibition	Innovation	Informational
4. Eisteddfod	£25K	Exhibition	Continuation	Impact on practice
5. Eureka Soundscape	£117K	Exhibition	Continuation	N/A
6. Living with Science	£87K	CD-ROMs	Innovation/ Implementation	Informational/ knowledge/skills
7. Science Fiction (CASE)	£33K	Workshops	Implementation /continuation	Informational/ knowledge/skills
8. Scottish Executive	£15K	Consultant to grant scheme	Continuation	New knowledge/skills
9. Winchester Festival	£16K	Festival	Continuation	Informational/ knowledge/skills
10. Planet Science website	£195K	Website	Continuation	Informational/ knowledge/skills
11. Making Sense of Science	£90K	Workshops	Continuation	Impact on practice
12. Bishop David Brown	£25K	Workshops	Continuation	New knowledge/skills

It is clear from our findings that any application of Fullan's change model to educational projects outside schools needs to treat his stages as non-sequential; indeed he acknowledges that the relationship between *initiation* and *implementation* is loosely coupled and interactive (2001). In support of other aspects of Fullan's model, data from case studies has reinforced the importance of local and institutional factors in successful change management. In several of the case studies, the process of managing the Science Learning project has resulted in some degree of institutional culture shift. For example, the approach adopted with the multimedia company

Braunarts on Antarctic Waves (case study 2) was viewed by the British Antarctic Survey as being such a successful way of working that:

“when looking at other collaborations it is built into criteria for selection... the positive experience of working with Braunarts enabled greater creativity in other projects.” (BAS Head of Press, Public Relations and Education).

Data from the web survey, however, indicate that most awardees felt that they had very little commitment from senior management within the organisations concerned, and that change had occurred *despite* rather than because of institutional factors. This may support Wellner’s assertion (2000: 450) that Fullan’s framework is more “an aspirational moral code of behaviour than a theory of change.” Similarly, the stress laid by Fullan (2003) on *moral purpose* on the part of teachers in implementing educational change was difficult to substantiate from the data (as distinct from the drive and zeal exhibited by many awardees) suggests that this aspect of Fullan’s theory is “optimistic and possibly idealistic in spirit” (Harris 2000: 100).

Although developed in an inservice training context, Harland and Kinder’s (1997) hierarchy of outcomes (table 1) provided a useful framework against which to gauge the impact of case study projects (see table 5). Certain types of outcomes however, appear easier to evidence from data than others; the provision of ‘information’ or ‘new knowledge and skills’ was reported by stakeholders from eight of the projects, and three were able to demonstrate ‘impact on practice’ on the part of teachers or other professionals in terms of their use of new resources in the classroom.

Examples of ‘motivational and affective outcomes’ were less common in the data (other than enthusiasm reported by teachers in four of the case studies); there needs to be greater emphasis upon elicitation of these types of data during interviews with participants in future studies, as carried out by Harland and Kinder (1997), leading them to place motivational and affective outcomes below the development of new knowledge and skills in their hierarchical framework.

Discussion – evaluation methodology

The multi-method approach (Saxe and Fine 1979, Patton 1990) adopted by this evaluation study enabled the researchers to triangulate and elaborate findings between the principal data sources (Bennett 2003). For example, case studies and web survey data have supported the widespread perceptions of project ‘success’ present in the documentary evidence (see discussion of question A6 above) and similar corroboration is present in relation to the targeting of disadvantaged groups (question B3). In some cases, case study data have apparently contradicted findings from documentary analysis – for example in the case of outcomes and impact (question A5) – however this can be seen as a case of elaboration as the detailed nature of the case study enquiry was able to capture outcomes for individuals and groups which did not feature in the documentation. Our limited access to documentation from NESTA was a disadvantage in this respect, and one of the problematic features of the relationship with the commissioning body referred to earlier. The use of case studies enabled us to access the ‘multiple and constructed realities’ of policy-makers (NESTA staff), programme staff and, in some cases, clients, exemplifying aspects of what Guba and Lincoln (1989) have described as ‘constructivist evaluation’, in which contradictory data may well result from the different perspectives of stakeholders. The triangulation

of data sources has also provided a degree of what Hopkins (1989) terms ‘internal validity’, though the retrospective nature of the research has not enabled data to be collected at different points in time to compare against each other. The research also sought subject-confirmed validity by reflecting back case study findings to the awardees concerned for their comments. Reliability in analysis and interpretation of documents was checked by two researchers independently summarising a sub-sample of documentation onto a spreadsheet using the headings on p. 13 and these summaries compared with each other. The analysis of the web survey was sent to all four researchers in the team for verification, and each case study was similarly circulated for comment.

Several methodological and philosophical difficulties arose as a consequence of adopting a multi-method approach to this commissioned study. Greene (1994) characterises such approaches as ‘pragmatic’, with a focus towards decision-making and utilisation. Patton (1990), an advocate of such pragmatism, recommends a ‘paradigm of choices’ which ‘rejects methodological orthodoxy in favour of methodological appropriateness’. This was consistent with the aim to report ‘why NESTA should be involved, how existing projects work, and why they are working’. Yet the need ‘to share with external and internal stakeholders a clear and informed *Story* of why there is a need for these projects’ required a case-study methodology more characteristic of interpretative (Greene 1994) or constructivist (Guba and Lincoln 1989) approaches. Our concern to reflect the views of stakeholders in these case studies placed great emphasis upon their interpretations of both impact and success, which, owing to our limited access to NESTA documentation were not all able to be substantiated by external sources. The case-studies provided the richest

source of data, shifting the weight of the report towards the interpretative and away from the pragmatic. Politically, the emphasis placed on case study data and its narrative style, incorporating different perspectives, was not appreciated by the commissioning body, as it limited the use NESTA felt it could make of our findings to justify its expenditure. Furthermore, although the agreed research questions were largely non-causal (Miles and Huberman 1984), in receiving the report the commissioning body asked for causal and comparative links to be made between a number of the data sets. This was done as far as possible, given the incomplete nature of the documentary evidence, which arrived in packets of varying sizes over a period of months, and the limited sample of respondents to the web survey. The team was furnished with a list of awardees' email addresses, which initially contained inaccuracies and omissions requiring significant research to rectify. However no similar lists of contact details for other stakeholders in any of the projects (e.g. participants) were held by NESTA, and our requests for such lists from awardees in the web survey went unanswered. Only in the case studies were we able to talk to a range of stakeholders. In summary, the multi-method approach espoused by this study became more reliant on data from one of the three methods than either the research team or commissioning body would have preferred.

Implications and Recommendations

For researchers conducting commissioned, bureaucratic evaluations of large educational programmes, this paper has a number of implications:

1. Researchers need to clarify through discussion with the commissioning body where the emphasis within the evaluation should lie. If it is really about 'telling a story', a case-study approach involving the generation of rich,

qualitative data sets examining the programme from different perspectives may be appropriate. If, however, the aims are in reality more pragmatic, seeking causal links and comparison between data sets, a multi-method approach can be recommended, provided the research team can reassure themselves that sufficiently complete data sets exist within the commissioning body – both in terms of documentary evidence and stakeholder contact information – for such an approach to be feasible.

2. In evaluating the outcomes or impacts of a large-scale programme, it is important to establish at the outset what stage each element of the programme has reached; in other words the extent to which the evaluation is to be undertaken retrospectively. Although lasting impact is more appropriately assessed at a time after the implementation of the programme, such data become increasingly difficult to access, particularly if the project(s) concerned had no follow-up strategy to contact participants at a later stage. Evaluators are left reliant upon what evidence was collected during implementation, and the perceptions of as many stakeholders as can be contacted. Obviously, for elements of the programme that are ongoing, evaluators can collect their own observation and interview data from participants, but this is unlikely to capture lasting impact. Evaluators need to point out to commissioning bodies that impact evaluation needs to be built into the programme design and carried out over the whole period of implementation and beyond, otherwise it is unlikely that sufficiently robust data can be collected retrospectively.
3. In seeking to characterise processes of educational change within theoretical frameworks, evaluators may consider Fullan's (2001) model as a possible option, provided the contexts to be evaluated are school-related and the stages

treated as potentially non-sequential. In classifying outcomes for practitioners, Harland and Kinder's hierarchy (1997) can also be recommended, with the reservations outlined above, provided access can be provided to eliciting motivational and affective changes from participants. The author has found both frameworks particularly useful when comparing case studies.

In terms of recommendations to NESTA and other funding bodies (whether connected with science education or otherwise), the findings from this study suggest that:

1. In order to address the aim of 'telling the story of why there is a need for such projects', NESTA should support applicants for awards in specifying the needs analysis research they have undertaken in more detail than appears to be the case currently.
2. To monitor outcomes and impact more rigorously, NESTA should support applicants in setting clearer success criteria and indicators, and to set out a clear evaluation strategy including the nomination of sources of evidence that will be reported on in interim and final reports.
3. To ensure a more complete and useful document set for summary evaluation, NESTA should consider standardising the reporting procedure for all projects at regular intervals using a standard framework to ensure that comparable data is collected.
4. As an evaluation strategy for the future, NESTA should consider appointing external evaluators for each project to work with awardees, monitor progress and collect evidence of impact throughout the projects and subsequently.
5. In order to build on existing success and maximise value-for-money from investment, NESTA should consider working with selected awardees after the

formal project funding periods have elapsed, particularly in the case of those projects with a tangible outcome that would benefit from wider dissemination or marketing. Awardees could be selected for this on the rigour and outcomes of their own evaluation procedures.

6. As a longer-term strategy to maximise impact upon the science education community, NESTA should consider occasional replication of projects in different contexts, in order to validate and refine methodologies developed during innovative projects. A division into ‘innovative’ and ‘replication’ awards (similar to that made by AZSTT) might be useful in gaining maximum benefit from ideas developed with NESTA funding.

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Appendix 1: Web-based Questionnaire

Study of NESTA-supported science learning projects

Section 1: basic information

Q1 Your name

Q2 Name of your project

Q3 Start date of your project (mm/yy)

Q4 End date of your project (anticipated if ongoing)

Q5 Current stage of your project

<i>setting up</i> <input type="radio"/>	<i>ongoing implementation</i> <input type="radio"/>	<i>other</i> <input type="radio"/>
<i>initial research</i> <input type="radio"/>	<i>completed</i> <input type="radio"/>	

Q6 Number of staff in your organisation

<i>1-10</i> <input type="radio"/>	<i>51-100</i> <input type="radio"/>	<i>501-1000</i> <input type="radio"/>	<i>not applicable</i> <input type="radio"/>
<i>11-50</i> <input type="radio"/>	<i>101-500</i> <input type="radio"/>	<i>1000+</i> <input type="radio"/>	

Q7 Amount of funding from sources other than NESTA (£)

Section 2: background and aims of your project

Q8 What needs does/did your project seek to address?

Need 1

Need 2

Q9 How did you become aware of these needs? (tick as many boxes as apply)

<i>preliminary research</i> <input type="checkbox"/>	<i>professional experience</i> <input type="checkbox"/>	<i>anecdotal evidence</i> <input type="checkbox"/>	<i>other</i> <input type="checkbox"/>
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Q10 Who are/were your target audience? (tick as many boxes as apply)

<i>pre-school children</i> <input type="checkbox"/>	<i>secondary age children (11-18)</i> <input type="checkbox"/>	<i>teachers</i> <input type="checkbox"/>	<i>other</i> <input type="checkbox"/>
<i>primary-age children (5-11)</i> <input type="checkbox"/>	<i>young adults</i> <input type="checkbox"/>	<i>general public</i> <input type="checkbox"/>	

Q11 To what extent does/did your project seek to reach 'disadvantaged groups'? (e.g. girls, minority ethnic groups, SEN)

<i>not at all</i> <input type="checkbox"/>	<i>to some extent</i> <input type="checkbox"/>	<i>to a great extent</i> <input type="checkbox"/>	<i>not sure</i> <input type="checkbox"/>
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Q12 What are/were the principal aims of your project?

Aim 1	<input type="text"/>	<input type="button" value="up"/>	<input type="button" value="down"/>
Aim 2	<input type="text"/>	<input type="button" value="up"/>	<input type="button" value="down"/>
Aim 3	<input type="text"/>	<input type="button" value="up"/>	<input type="button" value="down"/>
Aim 4	<input type="text"/>	<input type="button" value="up"/>	<input type="button" value="down"/>

Q13 Which of the following aspects of science does/did your project seek to address? (tick as many as apply)

<i>knowledge and understanding</i> <input type="checkbox"/>	<i>science and society</i> <input type="checkbox"/>	<i>biological sciences</i> <input type="checkbox"/>	<i>astronomy</i> <input type="checkbox"/>
<i>attitudes towards science</i> <input type="checkbox"/>	<i>controversial issues</i> <input type="checkbox"/>	<i>physical sciences</i> <input type="checkbox"/>	<i>environmental sciences</i> <input type="checkbox"/>
<i>images of science and scientists</i> <input type="checkbox"/>	<i>scientific enquiry skills</i> <input type="checkbox"/>	<i>earth sciences</i> <input type="checkbox"/>	

Q14 Does your project have measurable success criteria (if no please go to section 3)

Yes <input type="radio"/>	No <input type="radio"/>
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Q15 Please list your success criteria below

Criterion 1	<input type="text"/>	<input type="button" value="up"/>	<input type="button" value="down"/>
Criterion 2	<input type="text"/>	<input type="button" value="up"/>	<input type="button" value="down"/>
Criterion 3	<input type="text"/>	<input type="button" value="up"/>	<input type="button" value="down"/>
Criterion 4	<input type="text"/>	<input type="button" value="up"/>	<input type="button" value="down"/>

Section 3: project management

Q16 What helped you develop your project design? (please tick as many as apply)

<i>experience</i> <input type="checkbox"/>	<i>consultation</i> <input type="checkbox"/>	<i>previous work</i> <input type="checkbox"/>	<i>NESTA's help</i> <input type="checkbox"/>
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	research <input type="checkbox"/>	sudden inspiration <input type="checkbox"/>	NESTA's suggestion <input type="checkbox"/>
Q17	How much commitment to the project have you had from senior management within your organisation?		
	none <input type="checkbox"/>	a little <input type="checkbox"/>	good <input type="checkbox"/>
			total <input type="checkbox"/>
			not applicable <input type="checkbox"/>
Q18	How closely related is your project to your organisation's overall mission?		
	unrelated <input type="checkbox"/>	slightly related <input type="checkbox"/>	closely related <input type="checkbox"/>
			identical <input type="checkbox"/>
			not applicable <input type="checkbox"/>
Q19	How has the project been managed? (tick as many as apply)		
	single manager <input type="checkbox"/>	management team <input type="checkbox"/>	steering group <input type="checkbox"/>
			other <input type="checkbox"/>
			not applicable <input type="checkbox"/>
Q20	How closely have NESTA been involved in managing the project?		
	Not at all <input type="checkbox"/>	slightly <input type="checkbox"/>	quite involved <input type="checkbox"/>
			very involved <input type="checkbox"/>
			ran the project <input type="checkbox"/>
Q21	How many other organisations or groups have you worked with during the project?		
	<input type="text"/>		

Please answer the questions in sections 4 to 6 as best you can for the current stage of the project. Feel free to omit questions which are not yet relevant.

Section 4: project outcomes			
Q22	To your knowledge, approximately how many individuals in your target groups have been 'reached' by the project to date?		
	<input type="text"/>		
Q23	On average, approximately how much time has been spent working with each individual?		
	less than 1 hour <input type="checkbox"/>	2-5 hours <input type="checkbox"/>	2 days - 1 week <input type="checkbox"/>
	1-2 hours <input type="checkbox"/>	5 hours - 2 days <input type="checkbox"/>	more than a week <input type="checkbox"/>
Q24	Is there still ongoing work with target groups that we could observe?		
	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
Q25	What have you done for your target groups? (tick as many as apply)		
	given them new information? <input type="checkbox"/>	given them new skills? <input type="checkbox"/>	Improved their learning? <input type="checkbox"/>
	given them resources? <input type="checkbox"/>	changed their attitudes? <input type="checkbox"/>	
	raised their awareness? <input type="checkbox"/>	changed their professional culture? <input type="checkbox"/>	
Q26	Please expand on your answers to question 25 below:		
	<input type="text"/>		

Section 5: evaluation	
Q27	Has your project been...
	Internally evaluated (e.g. by members of your team)? <input type="checkbox"/>
	externally evaluated (e.g. by a team appointed by NESTA)? <input type="checkbox"/>
Q28	To what extent, in your view, has your project achieved each of its principal aims? (see Q12)

	<i>not at all</i>	<i>slightly</i>	<i>broadly</i>	<i>completely</i>	<i>not sure</i>
Aim 1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Aim 2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Aim 3	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Aim 4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q29 If applicable, to what extent, has your project met each of its success criteria? (see Q15)

	<i>not at all</i>	<i>slightly</i>	<i>broadly</i>	<i>completely</i>	<i>not sure</i>
Criterion 1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Criterion 2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Criterion 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Criterion 4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Q30 How much impact do you believe your project has had on your target audience in the short term?

<i>none</i>	<input type="radio"/>	<i>a little</i>	<input type="radio"/>	<i>a fair degree</i>	<input type="radio"/>	<i>a lot</i>	<input type="radio"/>	<i>not sure</i>	<input type="radio"/>
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Q31 How much impact do you anticipate that your project will have on your target audience in the medium to long term? (sustainability)

<i>none</i>	<input type="radio"/>	<i>a little</i>	<input type="radio"/>	<i>a fair degree</i>	<input type="radio"/>	<i>a lot</i>	<input type="radio"/>	<i>not sure</i>	<input type="radio"/>
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Q32 To what extent do you believe your project has reached 'disadvantaged groups'? (see Q11)

<i>none</i>	<input type="radio"/>	<i>a little</i>	<input type="radio"/>	<i>a fair degree</i>	<input type="radio"/>	<i>a lot</i>	<input type="radio"/>	<i>not applicable</i>	<input type="radio"/>
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Q33 To what extent do you believe your project has fed into the formal education system? (schools, colleges etc.)

<i>none</i>	<input type="radio"/>	<i>a little</i>	<input type="radio"/>	<i>a fair degree</i>	<input type="radio"/>	<i>a lot</i>	<input type="radio"/>	<i>not applicable</i>	<input type="radio"/>
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Q34 Please list available evidence of impact

Section 6: NESTA's support and dissemination

Q35 To what extent do you think your project would have achieved each of its principal aims without NESTA support? (see Q27)

	<i>not at all</i>	<i>slightly</i>	<i>broadly</i>	<i>completely</i>	<i>not sure</i>
Aim 1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Aim 2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Aim 3	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Aim 4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q36 To what extent did NESTA support facilitate new contacts, or your involvement in new networks?

<i>not at all</i>	<input type="radio"/>	<i>slightly</i>	<input type="radio"/>	<i>to quite an extent</i>	<input type="radio"/>	<i>hugely</i>	<input type="radio"/>	<i>not applicable</i>	<input type="radio"/>
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Q37 How should NESTA develop its support for science learning projects in the future?



Q38 **How have the messages from your project been disseminated?** (tick as many as apply)

<i>meetings</i>	<input type="checkbox"/>	<i>website</i>	<input type="checkbox"/>	<i>published resources</i>	<input type="checkbox"/>
<i>conference presentations/papers</i>	<input type="checkbox"/>	<i>radio/television</i>	<input type="checkbox"/>	<i>other</i>	<input type="checkbox"/>
<i>articles</i>	<input type="checkbox"/>	<i>press</i>	<input type="checkbox"/>		

Q39 Please provide details of dissemination products that we could access (e.g. website addresses, publication details)

Q40 Who else should we contact to ask about your project?

The image displays three sequential screenshots of a web browser window, illustrating the pagination controls for a search results page. The search query is "name, phone, email".

- Top Screenshot:** Shows the first page of results. The pagination controls at the bottom indicate the current page is 1, with a total of 10 results. The controls include a "Previous" button (disabled), a "Next" button, and a "Page 1 of 10" indicator.
- Middle Screenshot:** Shows the second page of results. The pagination controls indicate the current page is 2, with a total of 10 results. The controls include a "Previous" button, a "Next" button, and a "Page 2 of 10" indicator.
- Bottom Screenshot:** Shows the third page of results. The pagination controls indicate the current page is 3, with a total of 10 results. The controls include a "Previous" button, a "Next" button, and a "Page 3 of 10" indicator.

Q41 I give permission for the evaluation team to use the above data anonymously for future academic publications

Yes ☐ No ☒

Thank you very much for taking the time to complete this questionnaire!

[Reset](#) [Submit](#)

Appendix 2: Typical interview schedule for case study project (research questions in brackets)

1. Did you identify teaching composition as a weakness in secondary music education – if so, how? (A2)
2. How did you find out whether making links between music and environmental science was going to be popular with teachers and students? (A2)
3. What kinds of projects had you done before X that provided relevant experience? (B1)
4. In what ways did X present different challenges from previous projects? (B1)
5. Talk me through how you put together the X consortium. (A4)
6. What were the strengths and weaknesses of the consortium approach? (A4)
7. How was responsibility for the project managed within X? (A4)
8. Did AW change the way you work at all? (B4)
9. Did the allocation of budget change much from your initial proposal? If so, how and why? (A3)
10. Were you happy with the way the funding was allocated within the project? (A3)
11. Were the free copies distributed to every school/college where GCSE/A level music taught? Would you have any idea how many are using it? (B2)
12. How many have been sold? (B2)
13. How many students have been involved in the pilots and other events where X has been used? (B2)
14. I've noticed a few changes from the original proposal to the final CD-ROM. Can you talk me through some of the changes you made? (B5)
15. Do you have examples of work students have done using X? (A5)
16. Are there teachers we could talk to about how they've used it? (A5)
17. I was interested in your choice of schools for prototype testing – a good ethnic and social mix. Was that deliberate? (B3)
18. In the prototype testing, did you feel that pupils from all ethnic and social groups were able to engage with X? (B3)
19. Were you pleased with AW when it was finished? What do you feel are its strongest points? (A6)
20. Are there aspects of the resource you'd like to develop further? (A6)
21. How do you feel about the NESTA evaluation of the resource? (A6)
22. If NESTA had said 'no' to funding would you have dropped the project, or might the idea have emerged in another way? (B6)
23. How do you feel about the way NESTA have managed the funding and support for X? (B7)
24. Do you have any comments about the role of the project supervisor from NESTA? (B7)
25. You've clearly done lots of publicity and dissemination events – which have been the most effective? (B8)
26. Do you have any further plans for dissemination? (B7)